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### THE LOGICAL NECESSITY OF A CONSTANT IN THE CONCEPT OF SPACE

SINCE all things we know can only be experiences of the human mind, the investigation of subjective phenomena can in no way be either aided or restricted by a hypothesis of an external world; since at no point can an element not of experience enter into such an investigation. When such distinctions are used, they serve only to throw emphasis on certain orders of subjective phenomena (and this might be done without such a hypothesis). Hence in this examination of the subjective conditions of space appreciation, I feel justified in avoiding the question as to the external reality of space.

In the consideration of spatial experience there are two distinct fields, psychology and metaphysics. Psychology examines the manner and accompanying circumstances of individual experiences; metaphysics the nature of all such experiences and the logical necessities of spatial appreciation. To assert that the latter is spurious and that space is in the legitimate field of psychology only, would find a parallel in saying that logic is that also, and that the psychology of reasoning should and ultimately will displace formal logic. But it seems obvious that logic and the psychology of reasoning are widely different fields, though both investigate the manner of reasoning. One deals with formal necessities; the other with actual happenings. And it does not affect the logical necessities if in no single instance of successful reasoning the mind passed through the exact stages defined by logic; any more than the fact that there may be not a perfect geometric figure affects the necessity of geometry or its universal applicability in understanding actual figures. Hence, a logical and metaphysical enquiry into the nature of space is legitimate and as necessary for the understanding of subjective spatial phenomena as logic and geometry are in their respective fields.

The nature of the human mind conditions all experience; logic defines and excludes to make understandable. This limiting exclusiveness of logic may be, like the metric system of measurement, without analogy either in things *per se* or the unassociated elements of empirical data. But since things can be understood neither in their entirety nor particularity, it is the place of logic, conscious or otherwise, to exclude, bound, and for the human mind, simplify and partially associate the complex of empirical data. It is in the light of one of these fundamental axioms of thought, or necessities of thinking, that I wish to examine spatial phenomena. This is the necessity of a constant in all thought. With a meter stick that

varies chaotically from a barely visible point to an inconceivable length, distances could not be measured by us. Absolute variability is inconceivable. Some sort of constants are necessary for thought of any kind. For were absolute change perceived or conceived, in the instant of conception it would have become false, and so on indefinitely. And no amount of experience would assist in guessing the next change; since if it did, the change would have been only partial. Nor would any individual perception be a perception of absolute change, since it would be static. A memory of an instant of such perception would not be that of change.

Knowledge is through memory and association; but in a state of absolute change association would be useless. Hence, knowledge would be impossible and anything changing absolutely inconceivable.

Nor would the change, being gradual, but ultimately absolute, affect this. An absolute change must be a displacement and not a growth, since development, no matter how great, implies a constant. Duration applied to absolute change can only mean a series of minute absolute qualitative changes progressively displacing the older order till nothing but the new exists, and hence, the change becomes complete and absolute. But in this case there exists no more means of understanding the new order than if the change were instantaneously complete and absolute. The only constant is simultaneity, which is extrinsic to the quality of objects.

In spite, however, of the obviousness of this, there are followers of the doctrine of relativity who affirm just this sort of thing, saying that: there are many spaces; to talk of one space is meaningless; there is no constant in space.

Thus, asserted absolutely and carried to its ultimate application, the principle of relativity presumes actual space to change with the expansion of a solid; *i. e.*, when a solid expands under certain conditions, it remains spatially the same. But this is obviously absurd, since expansion can only be thought as an addition of space.

Nor can this be affected by the observer's not being able to perceive a small change relatively or a great change absolutely; *i. e.*, equi-proportional change. For perceiving relatively, relativity is an instrument of perception and the shortcomings of this instrument are not intrinsic to the organization of the subjective data as such. That we can not directly perceive a great change if it is equi-proportional, testifies that we have no external, spatially constant, criterion; but it does not at all affect the hypothesis that the subjective conditions of spatial conception necessitate an idea of spatial constancy.

The principle of relativity, asserted relatively, simply states the

relativity of our criteria of magnitudes, not of space itself. For, that there is not a constant does not at all follow from the fact that there is an appearance of quantitative diversity between different systems at rest or in uniform transition. An analogy to this may be found in the variety of appearance an object presents from various points of view or distance. But that this diversity of appearance argues that the object possesses no constant, but varies absolutely with the representation, is generally not held. For under similar determinants a similar impression can be duplicated. Thus with no mention as to the relative truth of each of the different points of view, it is generally asserted that there is a constant determinant of them all.

Hence, to say that there are many spaces, is like asserting that there are as many trees as there are impressions of one tree. Nor is it necessary, as we stated before, either to say whether the constant of the tree impression is external to us, or to say whether the constant of spatial perception is only a subjective condition or is objective.

But, if these different quantitative diversities of space from different systems were taken as discrete elements, or if each possible vision and feeling of the tree were regarded as such, then indeed there would be as many spaces and as many trees as there were ways of perceiving one. But, if this were true, no coordination would exist and hence no knowledge would be possible, as skeptics have so often used this illustration of the trees to prove. For by what criteria could one assert one perception to be truer than another? What knowledge we have of the tree must be through a synthesis of diverse impressions. However, if knowledge is to be granted at all, a constant determinant of some sort must be posited in the case both of the tree and of space.

But regardless of this, one must necessarily conclude from the foregoing that space is not in a different category from the surest elements of our knowledge: for there is a relative diversity in all, except in realms of pure ideality, as mathematics; and even here with irrational numbers and non-Euclidian geometry there are diverse ways of regarding identical phenomena.

Nor can this conclusion be avoided by asserting that space is not a real thing as the tree is; for to call either space or the tree the result of a subjective or of an objective constant is equally possible. As long as the tree is perceived or conceived, so long must it be perceived or conceived spatially. In both there are constant determinants (for us); and for this argument it is of no consequence whether it be thought that in one case the nature of things *per se* is the determinant. For us, space is as real as the tree.

The nature of this spatial constant which is the logical condition of all spatial conception is very difficult to define; especially with non-Euclidean geometry, a geometric invariant is almost impossible of conception. It resolves itself into a mere concept of the unchangeableness of space; a regarding of space as a static order. This of course is very indefinite. But the unsurmountable difficulties of more explicitly conceiving such a space are no greater than those of thus conceiving the constant determinant of the tree impressions.

Granting that the perception of time and space are relative to the velocity of a system from which they are perceived, in what media is another system with different velocity? How is velocity to be conceived with neither space nor time? Without the analysis of space and time velocity is meaningless; and even though the perceptions of space vary with the velocity of the system, the media through which the system moves can not be conceived as not having a spatial, constant, and continuous character. But even if there should be strong evidence that time and space were purely human analyses of a unified reality, yet none the less objective phenomena can be understood only through them.

Thus the theory of relativity, while supposing many spaces rather than many aspects of one, and denying that it can be conceived as a unity, yet must speak of various velocities of various systems, which is absurd with a concept of a continuous, constant space. The unreality of this space is not proved by the fact that no perception is truer than another; any more than that it follows that the constant determinant of the tree perceptions is unreal because no single perception is truer than another.

Stated simply, the basis of this analogy is, that diverse perceptual data must have some legitimate ground of synthesis or knowledge is impossible, and that variation in perceptual data does not necessarily mean variation in central determinants, if there is sufficient unity of character throughout to give the object uniqueness. That this latter qualification includes space is patent, for space is uniquely spatial and can not be confused with other things or qualities.

A constant is a necessity of human understanding. It is the logical condition of any knowledge, and where the constant is not definitely perceived (as in case of the tree and space) the supposition that there is one is unavoidable. The whole relativist point of view when stated absolutely is contrary to the necessities of thought and logic.

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